CLAIMS:

1. Thermostable enzyme exhibiting 3'-exonuclease-activity but essentially no DNA polymerase activity whereas this enzyme enhances fidelity of an amplification process when added to a second enzyme exhibiting polymerase activity.

2. Thermostable enzyme according to claim 1 obtainable from *Archeoglobus fulgidus*.

3. Thermostable enzyme according to claim 1 or 2 whereas this enzyme is able to cooperate as proofreading enzyme with a second enzyme exhibiting polymerase activity.

4. Thermostable enzyme according to claim 1, 2 or 3 whereas the enzyme exhibits reduced DNA polymerase activity.

5. Composition comprising a first thermostable enzyme exhibiting 3'-exonuclease-activity but essentially no DNA polymerase activity and a second enzyme exhibiting DNA polymerase activity whereas the fidelity of an amplification process is enhanced by the use of the composition in comparison to the use of the single second enzyme.

6. Composition according to claim 5 whereas the second enzyme is lacking proofreading activity.

7. Composition according to claim 5 or 6 whereas the second enzyme is Taq polymerase.

8. A method of preparing or amplifying DNA using a composition according to claim 6 or 7.

9. The method of claim 8 whereas prematurely terminated chains are trimmed by degradation from 3´ to 5´.

10. The method according to one of the claims 8 or 9 whereas mismatched ends of either a primer or the growing strand are removed.

11. The method according to one of the claims 8 to 10 whereas dUTP instead of TTP is present in the reaction mixture.

12. The method according to claim 11 whereas UNG is used for degradation of contaminating nucleic acids.

13. The method according to one of the claims 8 to 12 whereas the mixture of a
- first thermostable enzyme exhibiting 3'-exonuclease-activity but essentially no DNA polymerase activity and
- a second enzyme exhibiting DNA polymerase activity
produces PCR products with lower error rates compared to PCR products produced by the second enzyme exhibiting DNA polymerase activity in absence of the first thermostable enzyme exhibiting 3'-exonuclease-activity but essentially no DNA polymerase activity.

14. The method of claim 13 in which the mixture of first thermostable enzyme exhibiting 3'-exonuclease-activity but essentially no DNA polymerase activity and a second enzyme exhibiting DNA polymerase activity produces PCR products of greater length compared to PCR products produced by the second enzyme exhibiting DNA polymerase activity in absence of the first thermostable enzyme exhibiting 3'-exonuclease-activity but essentially no DNA polymerase activity

15. The method according to one of the claims 8 to 14 whereas the first thermostable enzyme exhibiting 3'-exonuclease-activity but essentially no DNA polymerase activity is related to the Exonuclease III derived from E.coli, but is thermostable.

16. The method according to one of the claims 8 to 15 whereas PCR products with blunt ends are obtained.

17. A method for amplifying DNA using a thermostable enzyme exhibiting 3'-exonuclease-activity which enzyme is not or only to a negligible extend active on linear single stranded DNA.

18. The method according to claim 17 wherein an enzyme according to any of claims 1 to 4 is used.